Stoller
Hanford Office

HGLP-LDR-019

299-E25-191 (A6597)
Log Data Report

Borehole Information:

Borehole:	299-E25-191 (A6597)		Site:	216-A-30 Crib	
Coordinates (WA St Plane)		GWL[1] (ft):	None	GWL Date:	06/05/06
North (m)	East (m)	Drill Date	Top of casing Elevation (ft)	Total Depth (ft)	Type
135543.121	575934.171	06/82	684.86	50	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	1.7	8 5/8	8	5/16	1.7	50

Borehole Notes:

Casing diameter and casing stickup measurements were acquired by the logging engineer using a caliper and steel tape. According to a well completion report, grout was placed around the 8-in. casing from 0 to 20 ft as a 10-in. surface casing was removed. A cement plug is reported to exist from 45 to 50 ft. During drilling contamination was reported from 15 to 19 ft and from 32 to 33 ft. Soil samples were reported as "moist" from 13 to 19 ft and at 45 and 50 ft. Logging measurements are referenced to the top of casing.

Logging Equipment Information:

Logging System:	Gamma 1E		Type:	SGLS (70%) SN: 34-TP40587A
Effective Calibration Date:	05/02/06	Calibration Reference:	DOE/EM-GJ1200-2006	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Logging System:	Gamma 2M		Type:	NMLS SN: H340207279
Effective Calibration Date:	08/02/06	Calibration Reference:	DOE/EM-GJ1283-2006	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	11/06/06	11/06/06			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	2.0	25.0			
Finish Depth (ft)	49.0	20.0			
Count Time (sec)	100	100			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A[2]	N/A			
Pre-Verification	AE202CAB	AE202CAB			
Start File	AE202000	AE202048			
Finish File	AE202047	AE202053			
Post-Verification	AE203CAA	AE203CAA			

Log Run	1	2 Repeat			
Depth Return Error (in.)	N/A	N/A			
Comments	No fine gain adjustment.	No fine gain adjustment.			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	11/07/06	11/07/06			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	20.0	35.0			
Finish Depth (ft)	49.0	40.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
Sample Interval (ft)	0.25	0.25			
ft/min	N/A	N/A			
Pre-Verification	BM017CAB	BM017CAB			
Start File	BM017000	BM017117			
Finish File	BM017116	BM017137			
Post-Verification	BM017CAA	BM017CAA			
Depth Return Error (in.)	N/A	N/A			
Comments	None	None			

Logging Operation Notes:

Logging was conducted with a centralizer on the sonde. Logging data acquisition is referenced to the top of casing. Repeat data were collected for the SGLS and NMLS to evaluate system performance.

Analysis Notes:

Analyst:	Henwood	Date:	11/10/06	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the logging system were performed before and after the day's data acquisition. The acceptance criteria were met.

A casing correction for 0.3125-in.-thick casing was applied to the log data.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1EMay06.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. The NMLS data were converted to percent volumetric moisture using calibrations established for 8-in. boreholes.

Results and Interpretations:

^{137}Cs is detected from 13 to 17 ft, and at 32 ft. The maximum concentration is measured at approximately 4 pCi/g at 14 ft.

In passive gamma-ray logging, the presence of anomalous gamma activity without detectable spectral lines associated with specific radionuclides may indicate the presence of a high-energy beta emitting radionuclide such as ^{90}Sr. (McCain and Koizumi 2002). Evidence of this situation is exhibited from 16 to 27 ft and from 33 to 43 ft. Incoherent gamma activity in this interval may be representative of ^{90}Sr concentrations greater than 500 pCi/g.

Moisture measurements indicate some variability, most notably at approximately 37 ft.

The repeat section indicates good agreement of the naturally occurring KUT and moisture.

Spectral gamma data acquired with the RLS in 1992 by Westinghouse Hanford Company is provided for comparison with the current SGLS measurements. After decay of the RLS ^{137}Cs concentrations from 1992 to 2006, good agreement is indicated. Additionally, the total gamma profiles for the two logging systems are similar suggesting no movement of contaminants since 1992. The RLS total count is less than the SGLS because the efficiency of the detector is 18% rather than 70% for the SGLS.

As noted above, anomalous, incoherent gamma activity at low energies is most likely related to Bremsstrahlung associated with high-energy beta activity from ^{90}Sr. This phenomenon has been observed in three boreholes (299-E25-190, -191, and -193) within the 216-A-30 crib, at similar depths. A comparison plot of ^{137}Cs and total gamma activity for these three boreholes is included. Intervals with suspected ^{90}Sr in excess of 500 to 1000 pCi/g are also included. This plot shows ^{90}Sr distributed over at least half of the total length of the crib. It is recommended that further investigations be undertaken to determine the full extent of ^{90}Sr contamination in this crib.

References:

McCain, R.G. and Koizumi, C.J., June 2002. Correlation of Spectral Gamma Log Response and Sr-90 Concentrations for a Steel-Cased Borehole, GJO-2002-322-TAR

List of Plots:

Depth Scale: 1" = 20 ft

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma, Moisture, & Dead Time
Moisture Repeat Data
Repeat Section of Natural Gamma Logs
SGLS & RLS Comparison
216-A-30 Cross Section

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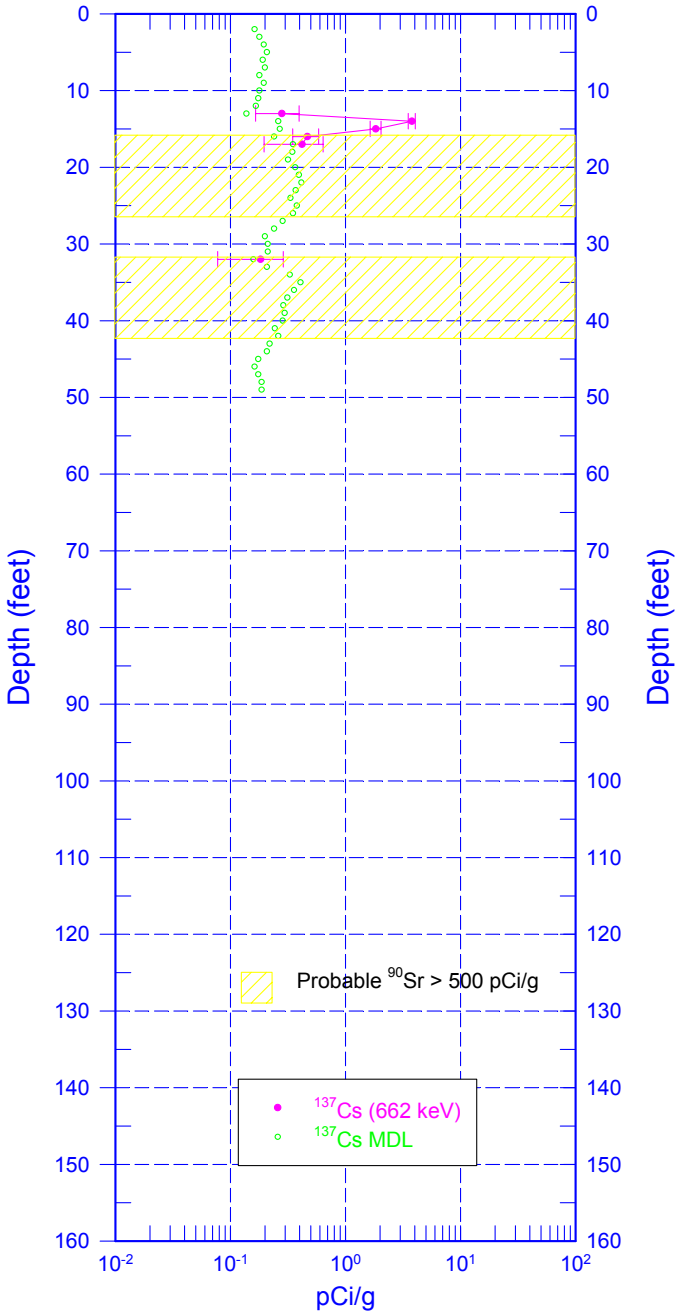
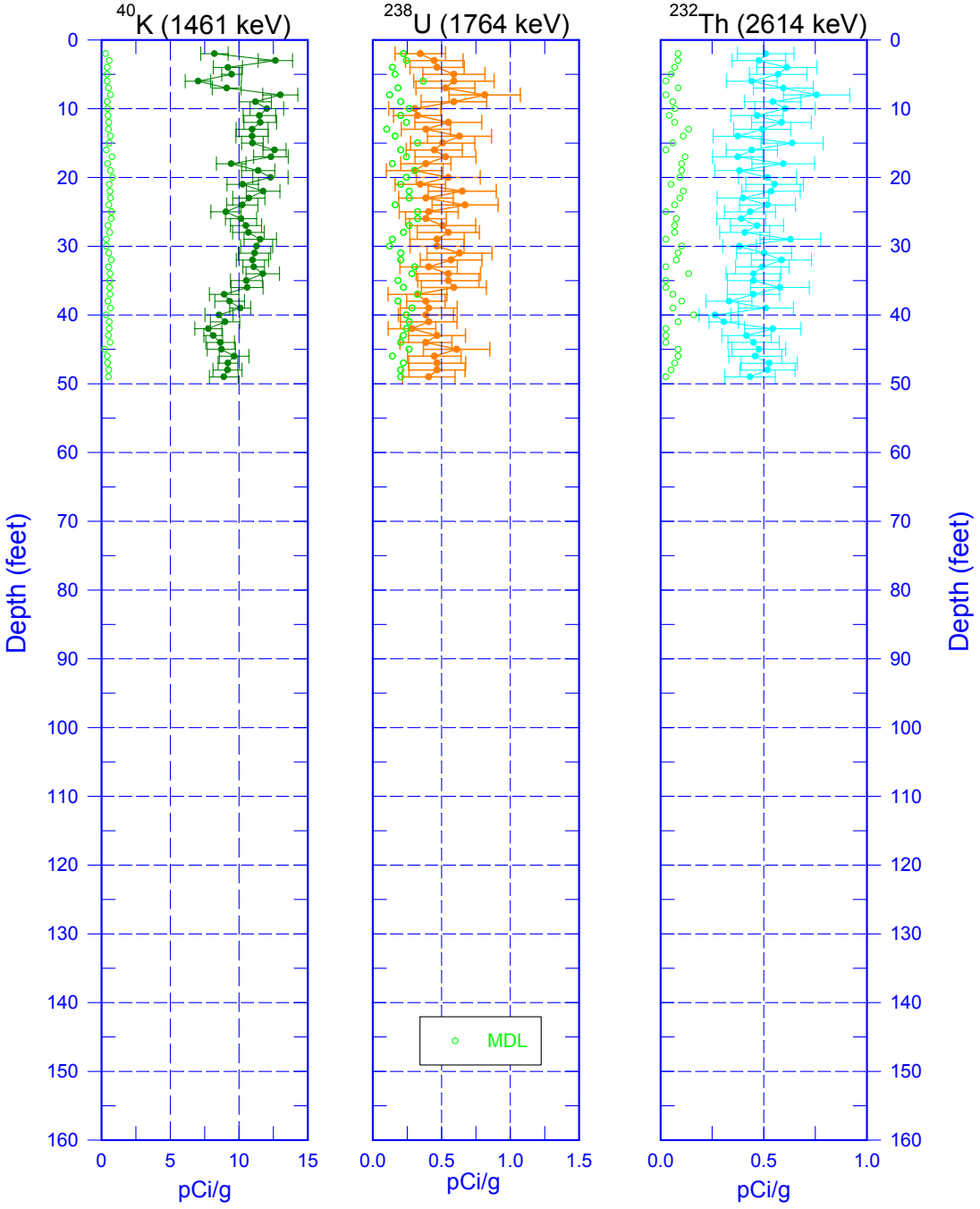
[1] GWL – groundwater level

299-E25-191 (A6597)
Manmade Radionuclides



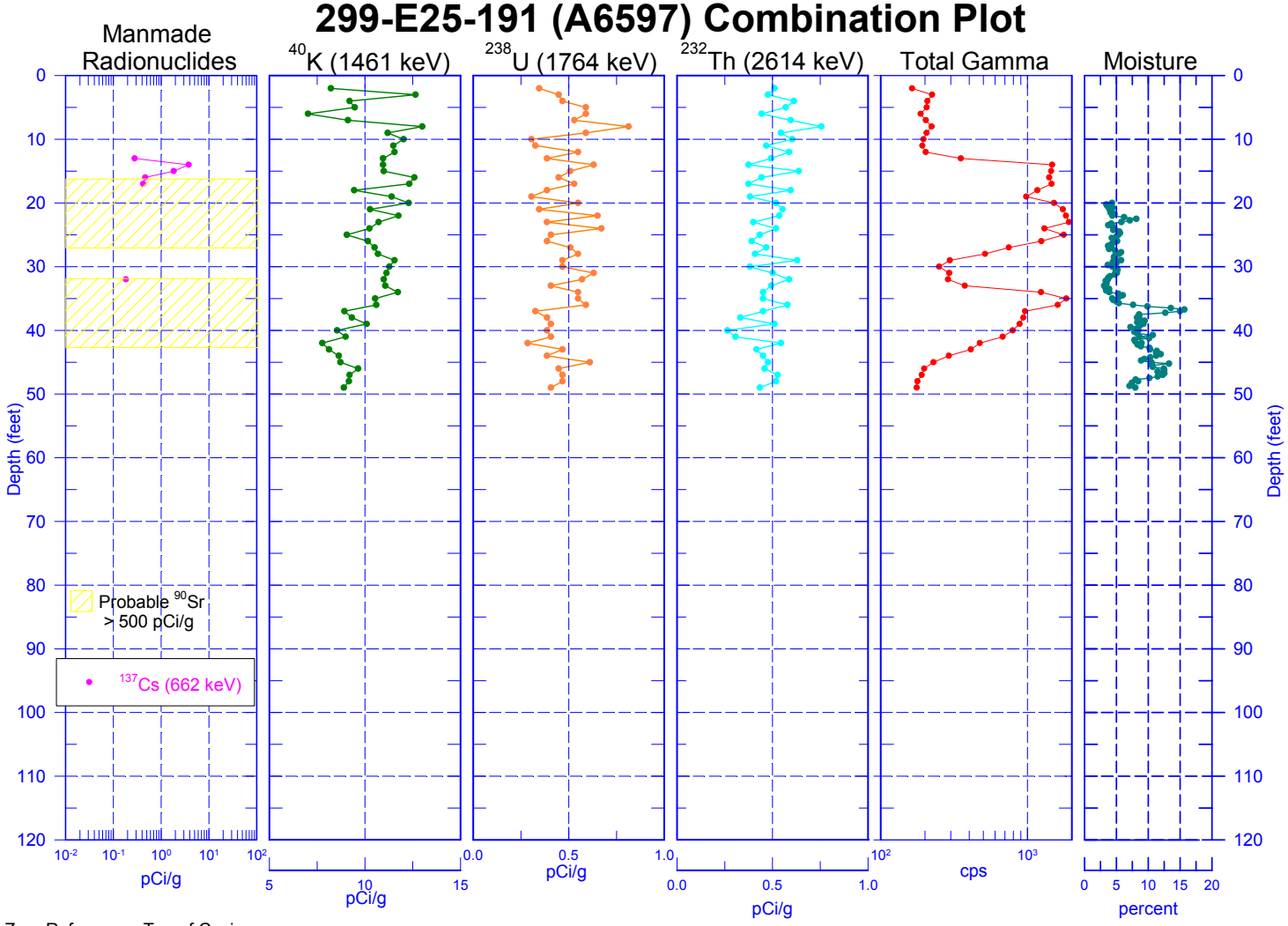
Zero Reference - Top of Casing

299-E25-191 (A6597)
Natural Gamma Logs



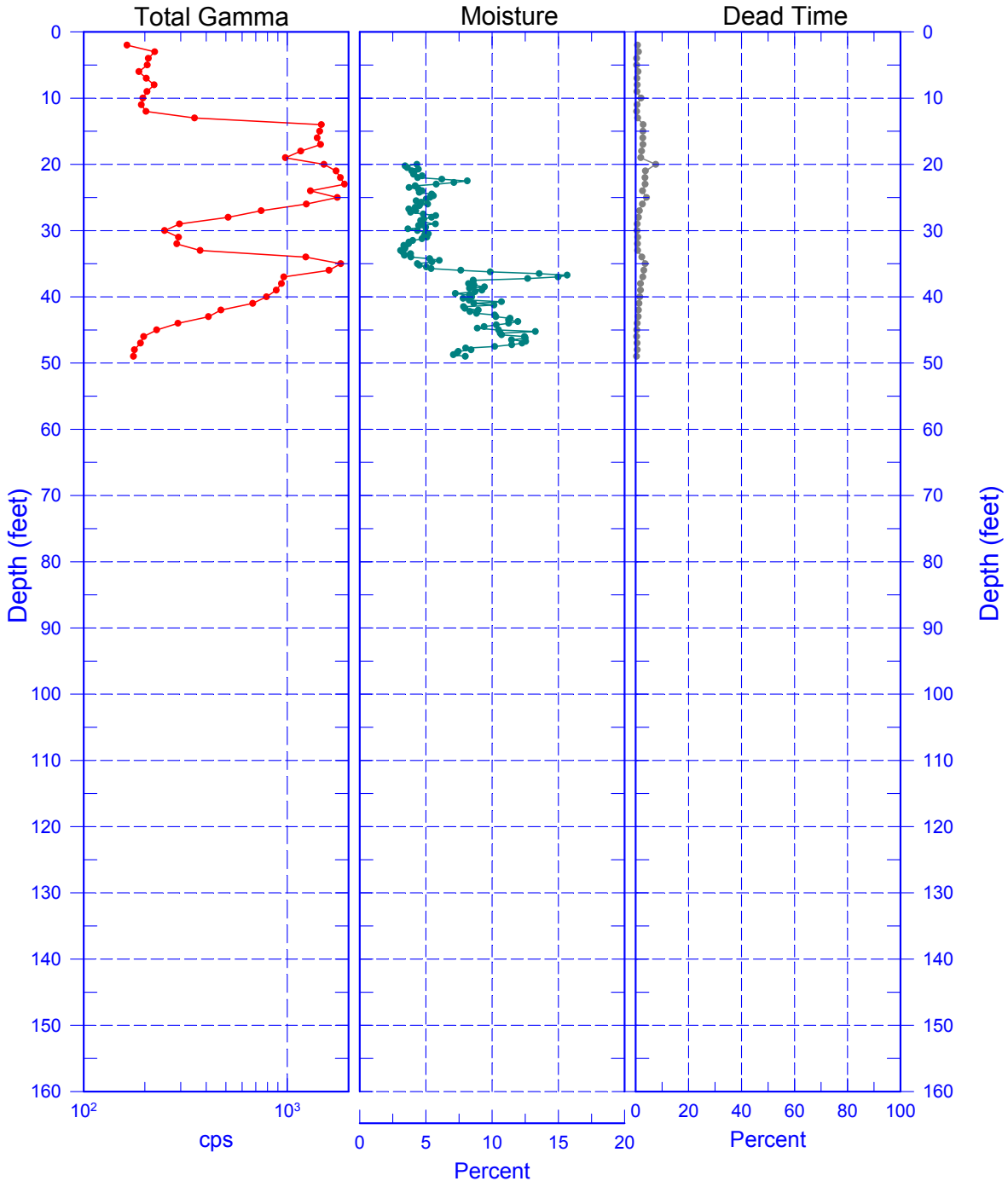
Zero Reference = Top of Casing

299-E25-191 (A6597) Combination Plot



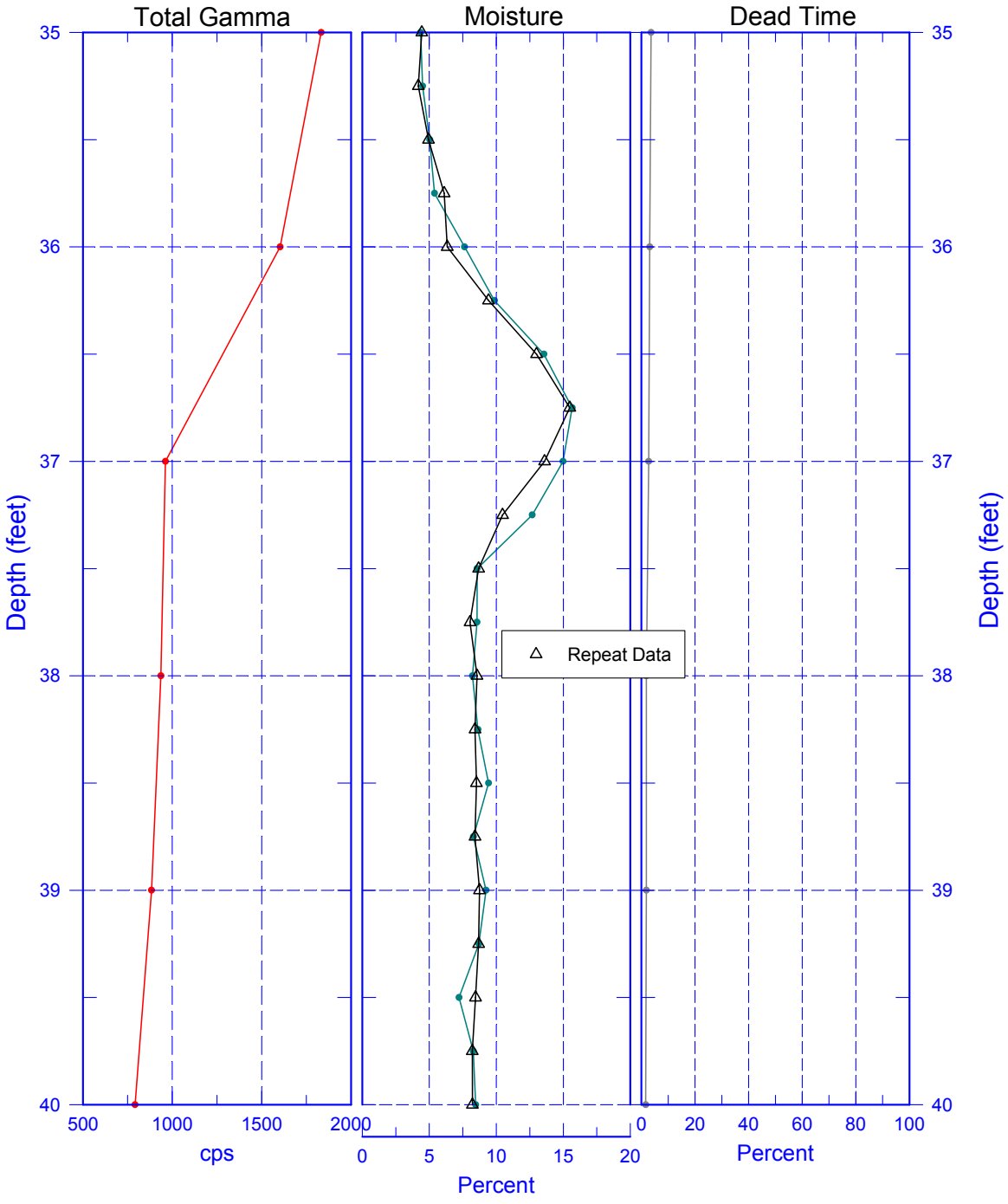
Zero Reference - Top of Casing

299-E25-191 (A6597)
Total Gamma, Moisture, & Dead Time



Reference - Top of Casing

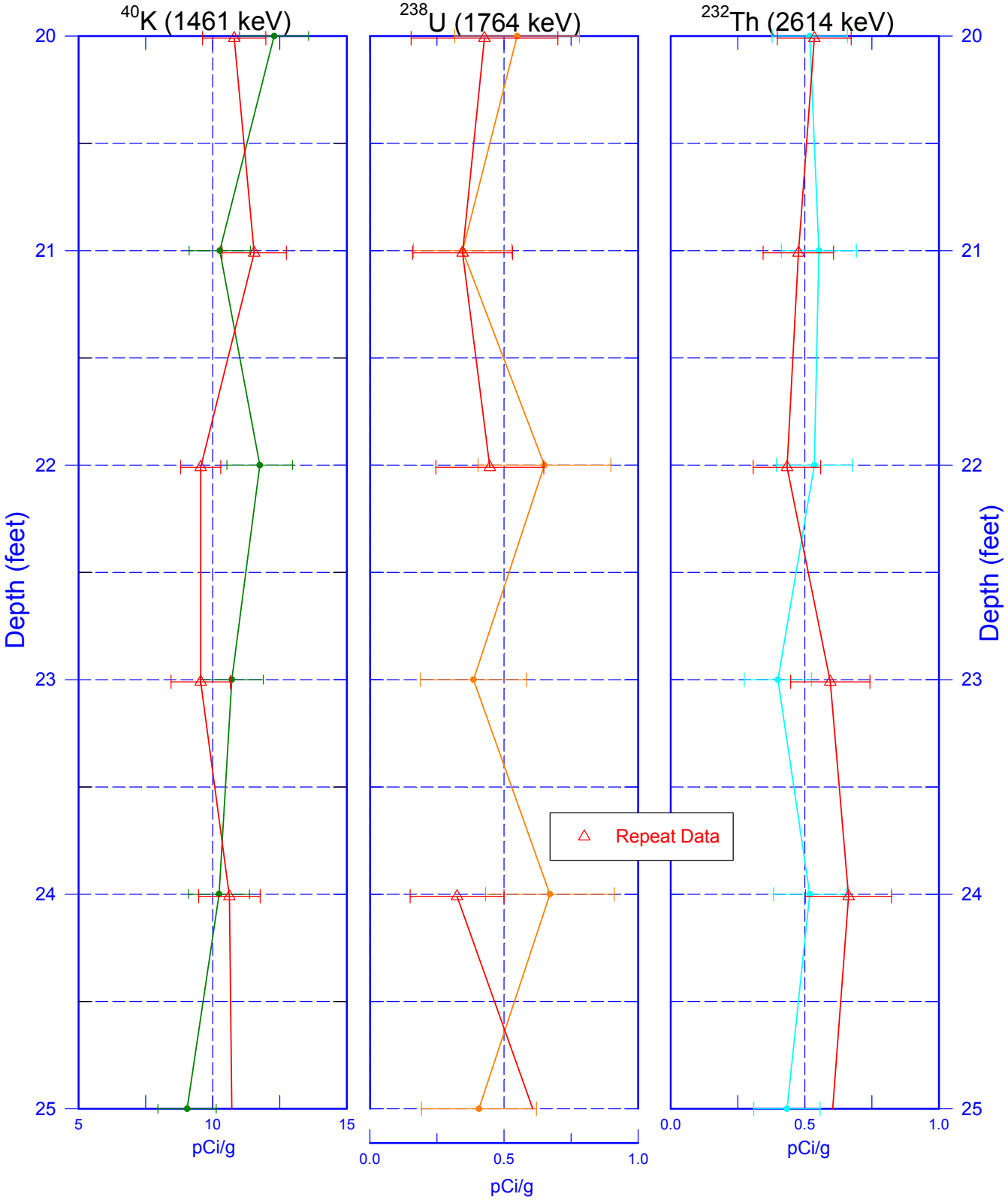
299-E25-191 (A6597)
Moisture Repeat Data



Reference - Top of Casing

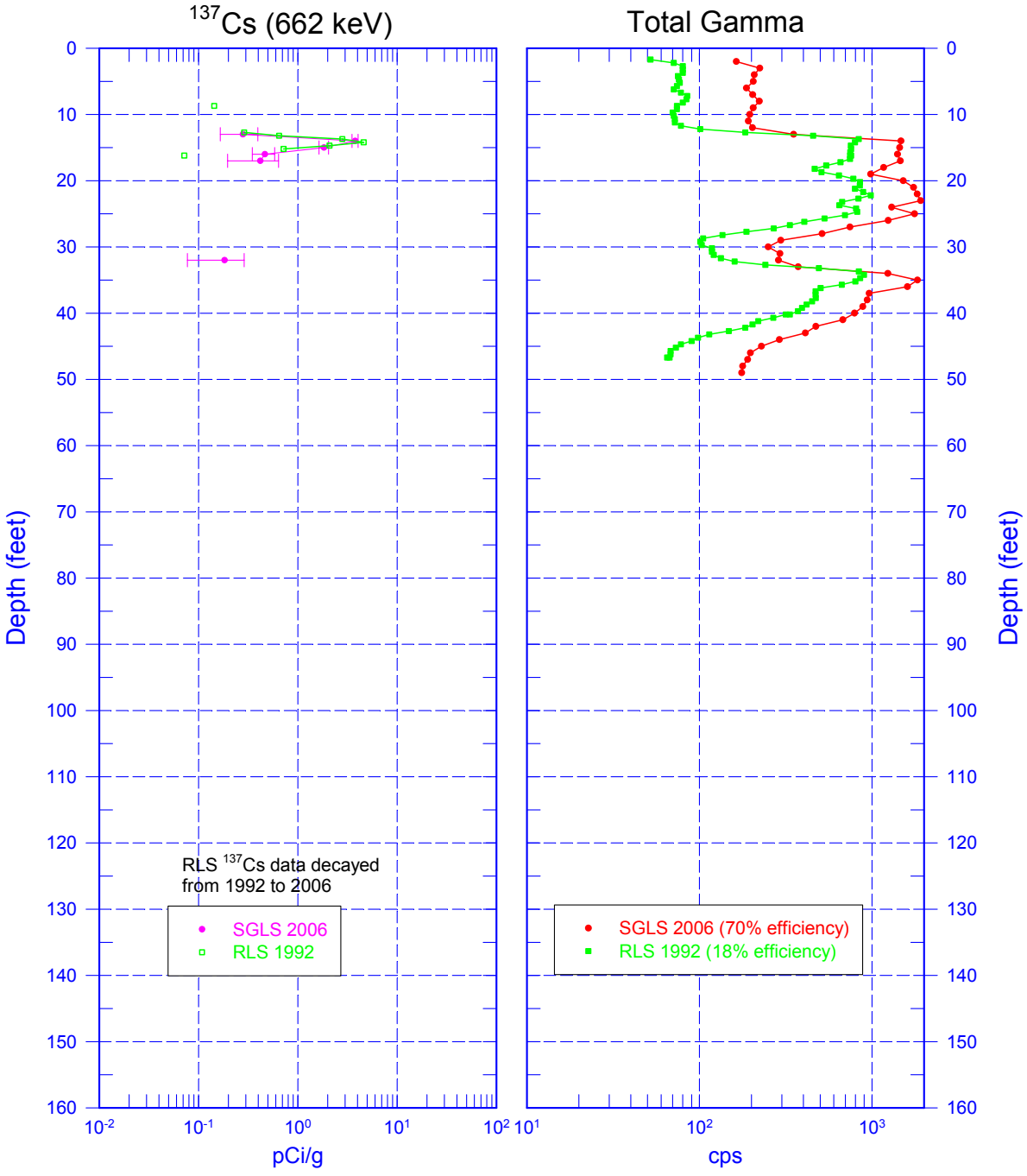
299-E25-191 (A6597)

Repeat Section of Natural Gamma Logs



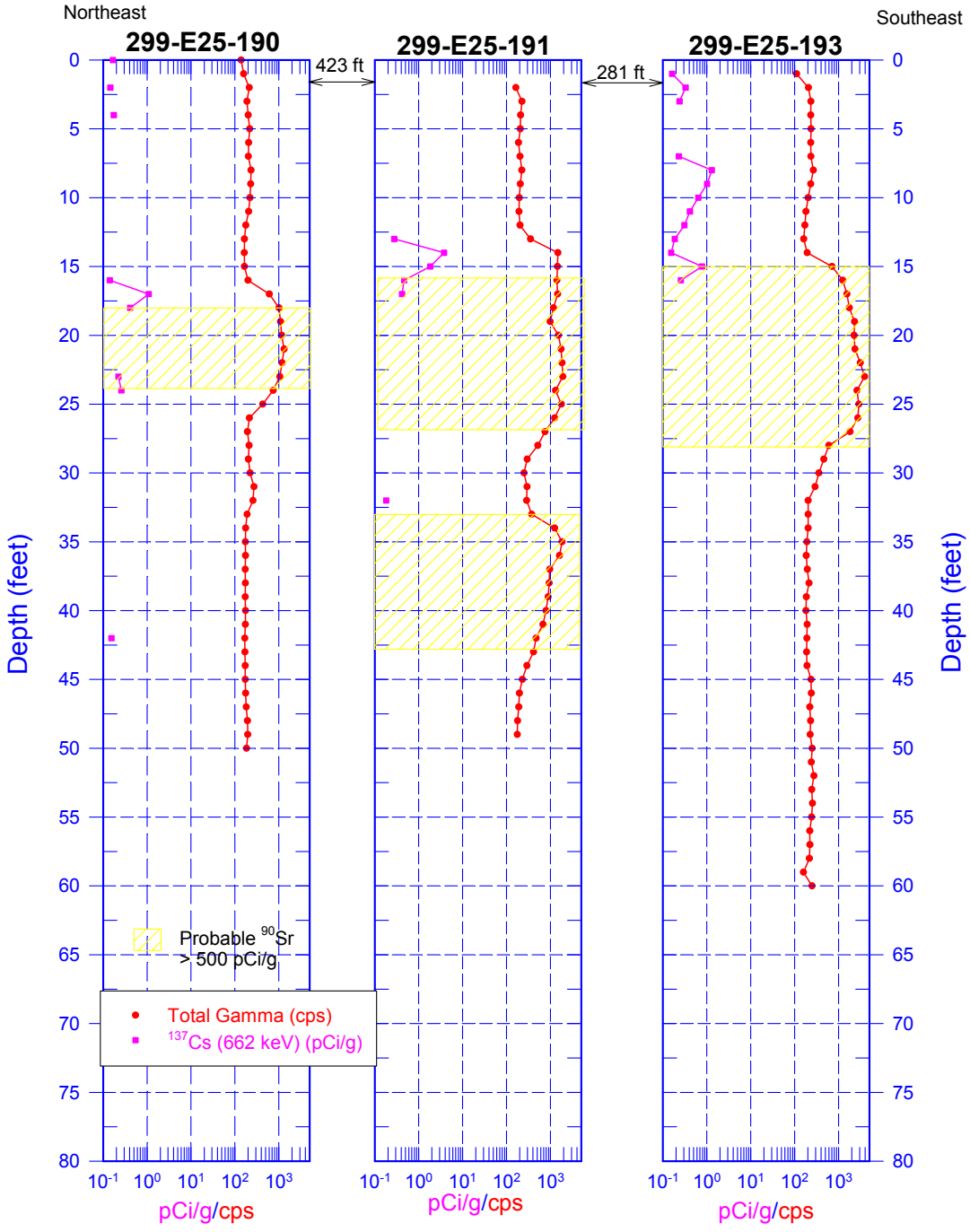
Zero Reference - Top of Casing

299-E25-191 (A6597)
SGLS & RLS Comparison



Zero Reference - Top of Casing

216-A-30 Crib Cross Section



Zero Reference = Top of Casing